

Social Supports as a Determinant of Community-Based Care Utilization among Rehabilitation Patients

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Objective. We determine the extent to which noninstitutionalized long-term care patients receive assistance from family members and friends, and evaluate the effect of this assistance on use of outpatient rehabilitative and personal care services.

Data Sources and Study Setting. Over 12 months, primary data were collected from 289 patients in noninstitutional settings after inpatient rehabilitation at three Boston-area rehabilitation hospitals. Data on patients' acute and rehabilitative stays were obtained from medical record reviews. Patients provided primary data on sociodemographics, living arrangements, social supports, functional status, health behaviors, life events, and use of outpatient services during the study period. The latter was verified and service charge data obtained from the care providers.

Study Design. The study was longitudinal and observational. Patient-provided information was obtained at one, six, and twelve months postdischarge.

Analytic Methods. Multivariate Tobit regression was used to evaluate the effect of social supports on patients' use of rehabilitative and personal care services, controlling for sociodemographics and functional status. Service use was measured as charges incurred during the 12-month study period.

Principal Findings. Results confirm the primary role of family and friends in providing daily personal care and identify the availability of that support as a key determinant of expenditures on community-based personal care services. Social supports do not predict outpatient rehabilitative service use.

Conclusions. Differing eligibility criteria seem appropriate for outpatient rehabilitative and personal care services. The current emphasis on functional status in determining rehabilitative service eligibility appears appropriate; but we find that considering patients' social supports would be both meaningful and appropriate in determining personal care service eligibility. This approach would avert the expense of making personal care services universally available, while facilitating assistance for patients whose functional and social status put them at increased risk of institutional placement.

Keywords. Community-based long-term care, personal care, rehabilitation, social supports

In a health care system built around curative care, the realm of long-term care lingers as the poorly defined, barely insured end of the continuum. And within the realm of long-term care, it is community-based or noninstitutional care services that continue to have the most difficult struggle for legitimacy.

Several factors have prevented the emergence of more comprehensive coverage for community-based care. These include the medical orientation of health insurance in the United States, the absence of evidence that providing community-based care effectively averts long-term institutionalization (Thornton, Dunstan, and Kemper 1988; Kemper 1988; Weissert 1985), and concerns regarding *ex post moral hazard*. The latter term describes the belief that expanded coverage of community-based long-term care would unleash a new era of public spending for services that are currently provided "for free" by families and friends—that families would cease or reduce their efforts or would demand payment for them if these services became reimbursable (Hanley, Wiener, and Harris 1991; The Pepper Commission 1990; Edelman and Hughes 1990; U.S. Congress, Office of Technology Assessment 1987).

GOALS OF THIS ANALYSIS

This analysis seeks to inform the debate regarding the legitimacy of expanded coverage for community-based long-term care in two important ways: (1) by documenting the extent to which noninstitutionalized long-term care patients rely on the assistance of family members and

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friends; and (2) by evaluating the effect of this assistance on the utilization of outpatient rehabilitative and personal care services.

We employ longitudinal data on patients discharged to the community following inpatient rehabilitation for either hip fracture or stroke. Together, these two diagnoses constitute approximately half of all inpatient rehabilitation admissions. And, while the majority have residual impairments at discharge that impede some aspect of their ability to care for themselves, three-quarters of first admissions for stroke and 87 percent of first admissions for hip fracture are discharged to the community after inpatient rehabilitation (Granger and Hamilton 1992). Thus, hip fracture and stroke patients constitute an important segment of community-dwelling patients who have undergone inpatient rehabilitation. In addition, we present evidence that the types of impairments and self-care deficits that these patients manifest, along with their sociodemographic profiles, may make them representative of the broader population of community-dwelling long-term care patients.

We hypothesize that the availability of social supports will affect, and in opposite ways, the use of outpatient rehabilitative and personal care services—increasing utilization of the former and decreasing utilization of the latter. The first hypothesis presumes that, with respect to rehabilitative services, family members cannot substitute for the skills and knowledge of professional staff but can facilitate the receipt of professional care (e.g., help to arrange appointments, provide transportation). The second hypothesis assumes that, where they are available and capable, family members and friends may assist patients with personal care tasks that would otherwise require paid assistance (e.g., personal care attendant, homemaker services, meals on wheels).

If a relationship can be established between the availability of social supports and use of community-based care services, we argue that the availability of social supports should be considered in any assessment of eligibility for community-based care. That is, in determining the extent of a patient's needs, one would consider not only the functional limitations that exist, but the context in which the patient must try to subsist with these limitations. To date, however, discussion about eligibility criteria for community-based care has focused almost exclusively on the patient's level of impairment—as measured by functional deficits (The Pepper Commission 1990; Rowland, Lyons, Neuman, et al. 1988).

METHODS

Data for this analysis are drawn from a longitudinal study of patients discharged from inpatient rehabilitation at each of three Boston area rehabilitation facilities—the Rehabilitation Institute at New England Medical Center Hospitals, Spaulding Rehabilitation Hospital, and New England Rehabilitation Hospital. The study sample numbered 289 patients.

SAMPLING CRITERIA

Sampling criteria were applied at two discrete stages: (1) enrolling the longitudinal panel, and (2) identifying the analytic sample. The exclusion criteria applied at each stage are presented in Table 1.

Selecting the Longitudinal Panel

The youngest patients (i.e., younger than 18 years) were excluded from the longitudinal study because pediatric and adult rehabilitation are considered distinct realms, confronting vastly different clinical and therapeutic issues. The next six exclusion criteria shown in Table 1

Table 1: Sampling Criteria Applied to Obtain Longitudinal Panel and Analytic Sample

Enrolling the Longitudinal Panel: Exclusion Criteria

- Under 18 years of age
- Died before discharge
- Left rehabilitation program before discharge (against medical advice)
- Not English speaking
- No telephone at site to which patient was discharged
- Discharged to residence outside of the United States
- Discharged to an institutional setting (nursing home, hospital, or other long-term care facility)
- Prior admission for current disability
- Rehabilitation length of stay fewer than 7 days
- Functional score greater than 75 (on a 100-point scale) upon admission to rehabilitation
- Primary focus of admission: (a) chronic pain, (b) substance abuse, (c) chronic renal dialysis, (d) brain tumor or any malignancy, (e) neuropsychiatric condition (e.g., dementia or psychosis), (f) medical management (therapeutic or palliative care rather than rehabilitation as the focus of care)

Source: Osberg, McGinnis, DeJong, et al. 1988.

Selecting the Analytic Sample: Exclusion Criteria

- Did not complete the longitudinal study
 - Diagnosis other than hip fracture or stroke
-

were necessitated by data collection constraints (i.e., English language required for survey response, telephone and local residence required for follow-up). The final four exclusion criteria were necessary to eliminate patients admitted for purposes other than participation in a full-fledged rehabilitation program.

Identifying the Analytic Sample

Patients who did not complete the longitudinal study were excluded from the analytic sample because their records lacked data on outpatient service charges (the dependent variable for this analysis). This eliminated 80 patients (15 died, 45 discontinued participation, and 20 were never successfully contacted by telephone or mail after the initiation of data collection). Data presented in Table 2 suggest that attrition was related to illness severity. Our regression analyses incorporate statistical weights to correct for any bias imposed by this nonrandom attrition of sicker patients. Sensitivity analyses reveal our results to be virtually unaffected by the application of these weights, but we retain them for purposes of analytic precision.

Of the patients who completed the longitudinal study ($N = 209$), approximately one-third had a diagnosis or procedure unrelated to hip fracture or stroke (e.g., spinal cord injury, traumatic brain injury, Guillain-Barré syndrome, amputation). These patients were excluded from the analytic sample because the nature of their impairments and the course of their rehabilitation made the determinants of their post-discharge care utilization distinct from those of the remainder of the sample. A discrete analysis of the determinants of service use among these patients is warranted but is not the subject of this analysis.

With these exclusions we obtained a final analytic sample of 137 patients, 79 of whom had suffered a stroke and 58 of whom had a hip fracture.

DATA COLLECTION

The data base includes information on patients' biomedical, sociodemographic and utilization characteristics across multiple health care settings—beginning with an acute hospitalization episode, extending through a rehabilitation stay and continuing through the 12 months following discharge from rehabilitation.

Information about the acute and rehabilitative inpatient stays was obtained from medical record reviews. Data on patients' sociodemographic profile, living arrangement, social supports, functional status, health behaviors, and life events were obtained at 1 and 12 months

Table 2: Comparison of Longitudinal Study Participants by Completion Status

Variable	Completed the Longitudinal Study (N = 209)		Did Not Complete the Longitudinal Study (N = 80)	p-Values*	
	Analytic Sample (N = 137)	Excluded from Analytic Sample (N = 72)		1	2
<i>Sociodemographics</i>					
Age 65 and older	70.07%	45.83%	76.67%	.0006	.4728
Female	59.85%	61.11%	53.33%	.8607	.5141
Married	46.72%	40.28%	33.33%	.1835	.3759
Income < \$15,000	65.22%	68.52%	72.00%	.6743	.5186
<i>Social Supports</i>					
Live alone	27.01%	21.13%	39.29%	.3994	.1741
Primary caregiver					
Spouse	25.55%	22.54%	31.03%	.5548	.6074
Child	11.68%	8.45%	6.90%	.4349	.4286
Relative/Friend	14.60%	11.27%	6.90%	.4483	.3279
Self	37.96%	50.70%	44.83%	.1119	.5712
Other	10.21%	7.04%	10.34%	.6279	.8252
<i>Inpatient Care</i>					
Acute length of stay (days)	18.61	31.51	18.63	.0001	.9905
Rehabilitation length of stay (days)	45.11	54.89	45.23	.0496	.9836
Disease severity (28-point scale)	13.28	14.00	14.96	.0497	.0012
<i>Functional Status</i>					
<i>(100-point scale)</i>	<i>Score</i>	<i>Score</i>	<i>Score</i>		
Discharge	72.91	75.36	62.55	.3786	.0169
1 Month postdischarge	82.96	82.13	78.00	.7734	.3068

*Key to p-values: 1 = comparing analytic sample to patients who completed the study but were excluded from the analytic sample; 2 = comparing analytic sample to patients who did not complete the longitudinal study.

postdischarge using a 22-page questionnaire sent to the patient's residence and completed by the patient or a designated surrogate. A telephone-administered checklist, completed at 6 and 12 months postdischarge, obtained information from patients on the outpatient services that they were currently receiving, had received in the past six months, or both. Table 3 enumerates these services. Verification of this

Table 3: Checklist of Outpatient Services Utilized during the 12 Months Postdischarge

<u>Rehabilitation Therapy</u>	<u>Diagnostic Services</u>
Physical therapy	X-ray
Occupational therapy	Lab & pathology
Speech therapy	EKG/ECG/EMG
Exercise therapy	CT scan
<u>Personal Care</u>	EEG
Home health aide	Emergency study
Day care	Tomography
Homemaker	Barium scan
Meals on wheels	Holter monitor
<u>Health Professional</u>	Nuclear medicine
Physician	Ultrasound
Dentist	Exercise study
Neurosurgeon	<u>Medical Resources</u>
Neuropsychiatrist	Operating room
Ophthalmologist	Emergency room
Psychiatrist	Ambulatory services
Orthopedist	Cautery
Physiatrist	Emergency first aid
Anesthesiologist	Surgery
Cardiologist	Renal dialysis
Nurse	Pharmacy
Clinic	Med/surg supplies
Social worker	Central service
	Wheelchair rental
	Injection
	Unna boot
	IV
	Blood
	Oxygen

information and data on service charges was subsequently obtained from the providers of care.

ANALYTIC MODEL

The analysis employs multivariate methods to explore the extent to which social supports influence the use of services among patients in the community who are recovering from a physically and, in some cases, cognitively disabling event.

Dependent Variables

In attempting to predict the use of outpatient care services, we differentiate between prescribed rehabilitative services (e.g., physical ther-

apy, occupational therapy, speech therapy) and services that represent assistance with personal care (i.e., home health aide, homemaker, day care, meals on wheels). Within the category of rehabilitative services, we differentiate between those received at home and those received in a formal rehabilitation setting (e.g., hospital outpatient rehabilitation department). The latter stratification is necessary in order to correct fully for differences in the charges associated with care in different settings.

Thus, we evaluate three separate models. The dependent variables for the models are outpatient charges for personal care services, for in-home rehabilitative care, and for rehabilitative care in a formal setting, respectively, during the 12 months postdischarge from inpatient rehabilitation.

Independent Variables

Because social supports are only one aspect of the constellation of factors that should influence patients' use of rehabilitative and personal care services, a multivariate model including other theoretically meaningful factors is most appropriate. We posit utilization of both rehabilitative and personal care services as a function of patients' functional status, sociodemographic characteristics, and social supports.

Our functional status measures include an indicator of the health event from which the patient was recovering (i.e., stroke or hip fracture) and an index of the patient's functional capacities at 1 and 12 months postdischarge. The latter is based on a validated 100-point scale that indicates the extent to which a patient can perform basic activities of daily living, with higher scores denoting greater independence (Mahoney and Barthel 1965; Granger, Sherwood, and Greer 1977; Schoening, Anderegg, Bergstron, et al. 1980).

Sociodemographic characteristics included in the models are gender, a binary indicator of age beyond 65 years, and insurance coverage. Because all study participants age 65 and older were enrolled in Medicare, the binary age indicator also indicates Medicare coverage. An indicator of supplementary Medicare insurance (i.e., Medex) is also included. Among nonelderly study participants ($N = 41$), 90 percent had private health insurance and the remaining 10 percent were publicly insured through Medicaid.¹

Our measures of social support include an indicator of the patient's living arrangement (i.e., alone versus with others) and four binary variables identifying the patient's primary source of assistance with daily personal care. Three of the four binary variables indicate

primary assistance from those we call "affiliated" caregivers—the patient's spouse ($N = 35$), child ($N = 16$) or another relative or friend ($N = 20$). The fourth binary variable indicates that the patient attends to the majority of his or her own daily care needs ($N = 52$). The fifth (omitted) category indicates that assistance comes primarily from an "unaffiliated" source of care (i.e., a paid helper or other individual) ($N = 14$).

Note that we cannot infer a lack of social supports among patients who attend to the majority of their own daily care (i.e., the fourth binary indicator of daily care). More than half of these patients live with at least one relative or friend, and 63 percent of these report receiving some (though not primary) assistance from the other household members. Indeed, their relative self-reliance appears to result from higher functional status rather than from social isolation. One month postdischarge, 89 percent of patients in this group scored 90 points or higher on the 100-point functional status scale. Thus, in discussing the role of affiliated provider support as a determinant of service utilization, we consider three patient groups: (1) those who attend to the majority of their own daily care, (2) those who rely primarily on an affiliated individual, and (3) those who rely on an unaffiliated individual.

ANALYTIC METHOD: REGRESSION ON CENSORED DATA

In the 12 months following discharge, 65 percent of our sample had no expenditure on personal care services and 17 percent spent nothing on rehabilitative services. In this way, 0 becomes a censoring point—a lower limit beyond which one could not observe values for the dependent variable. We apply Tobit regression to avoid the biasing effects that would occur with the application of ordinary least squares (OLS) methods to these censored data.²

GENERALIZABILITY

A maximally conservative approach will limit the generalizability of our study results to patients discharged to the community following inpatient rehabilitation for hip fracture or stroke. This accounts for approximately two-thirds of all patients discharged to the community following inpatient rehabilitation (Granger and Hamilton 1992).

However, evidence of the similarities between this group and the broader population of noninstitutionalized long-term care patients indicates that some relaxation of these constraints on generalizability

Table 4: Sociodemographic Profile of the Analytic Sample versus U.S. Community-Dwelling Long-Term Care Patients

<i>Sociodemographic Characteristic</i>	<i>Analytic Sample (N = 137)</i>	<i>Community-Dwelling Long-Term Care Patients, U.S. (N = 2,973,000)*</i>
<u><i>Age</i></u>		
< 65	29.93%	28.67%
65-84	56.93%	54.14%
85 and over	13.14%	17.19%
<u><i>Gender</i></u>		
Male	40.15%	37.71%
Female	59.85%	62.29%
<u><i>Marital Status</i></u>		
Married	46.72%	45.88%
Never married	9.49%	6.59%
Divorced or separated	6.57%	7.06%
Widowed	37.23%	40.46%
<u><i>Living Arrangement</i></u>		
Alone	27.01%	26.98%
With spouse	45.98%	45.04%
With other	27.01%	27.99%
<u><i>Annual Income</i></u>		
< \$15,000	65.22%	66.73%
\$15,000-\$24,999	12.17%	11.23%
\$25,000 or more	22.61%	22.04%

*Data on U.S. community-dwelling long-term care patients are derived from the National Health Interview Survey (National Center for Health Statistics 1986). The population represented here includes that portion of civilian noninstitutionalized adults with chronic health conditions who require assistance with one or more basic physical activities, as specified by the NCHS (i.e., walking, going outside, bathing, dressing, using the toilet, eating, getting in or out of bed or chair).

may be warranted. Data from the National Center for Health Statistics (NCHS) allow us to compare our analytic sample to the general population of noninstitutionalized long-term care patients in the United States. Table 4 reveals that the sociodemographic characteristics of our analytic sample are virtually identical to those of noninstitutionalized long-term care patients nationwide. In addition, the two groups appear to be comparable in their level of functional impairment. Seventy-five percent of patients in both groups require assistance with one or more aspects of mobility (i.e., walking, transfer from bed and/or chair, transfer to bath). Of patients in the NCHS and analytic samples, 30 and 42 percent, respectively, require assistance with at least one aspect

Table 5: Household Composition of Analytic Sample by Age Group

<i>Household Composition</i>	<i>Age < 65 (N = 41)</i>	<i>Age 65+ (N = 96)</i>	<i>Total (N = 137)</i>
Alone	12.2%	33.3%	27.0%
Spouse only	22.0	28.1	26.3
Child/Children only	7.3	12.5	10.9
Spouse and other relatives	43.7	9.3	19.7
Child and other relatives	2.5	5.2	4.4
Other relatives only	9.8	9.4	9.5
Friend only	2.5	1.1	1.5
Paid attendant	—	1.1	0.7
Total	100.0	100.0	100.0

of self-care (i.e., dressing, eating, toileting) (National Center for Health Statistics 1986). Available data do not permit us to evaluate the type and/or intensity of assistance required by the sample and referent populations.

RESULTS

THE AVAILABILITY OF SOCIAL SUPPORTS

Table 5 reveals the household composition of elderly and nonelderly study participants. Two-thirds of elderly patients in our sample reside with at least one other individual, most typically a spouse or child. These findings are quite consistent with those reported by other studies of community-dwelling elderly (Kotlikoff and Morris 1989; Shanas 1979b; Gilbert, Branch and Orav 1992) and with data from the National Center for Health Statistics (see Table 4).

While older patients—here and nationally (National Center for Health Statistics 1986)—are more likely than younger ones to reside alone ($p < .01$), the data reveal no differences between age groups in the availability and involvement of affiliated care providers. Half of both young and old patients identify a family member or friend as their primary provider of daily personal care ($p = .78$). And in both age groups, an equally small minority of patients rely on unaffiliated (paid) providers for the majority of their daily personal care ($p = .29$).

The data emphasize the primacy of the role taken by family members and friends in providing patients' daily care. Eighty-five percent of sample members who live with others report that they receive some of their care from these household members. Among those who live

alone ($N = 37$), two-thirds report that they are able to attend to the majority of their own care needs. Their higher functional status scores relative to those of patients living alone and relying on others for care ($p = .001$) lend credence to the reliability and validity of these self-reports. For the remaining patients living alone, a child, other relative, or friend is reported to be the primary provider of daily care in two-thirds of cases. The remaining one-third of patients who live alone and do not attend to their own care needs rely on the services of a paid attendant for their daily care.

The goal of our multivariate analyses, then, was to evaluate the role of these social supports with respect to patients' utilization of personal and rehabilitative care services.

RESULTS OF THE REGRESSION MODELS

Our regression analyses reveal important differences between the determinants of personal and rehabilitative care utilization among community-dwelling rehabilitation patients. Results of the multivariate models are presented in Table 6.

Utilization of Personal Care Services

Dollars spent on personal care services during the 12 months following discharge from a rehabilitation hospital are shown to be primarily a function of patients' social supports and functional status. Incremental analysis of R^2 values reveals sociodemographic characteristics to be the least important group of predictors.³

Social Supports. As hypothesized, the model reveals that patients who identify an affiliated individual as their primary source of daily care spend substantially less on personal care services than those who rely on unaffiliated sources of care. Controlling for sociodemographic characteristics, living arrangement, and functional status, patients who received the majority of their daily care from a spouse, child, relative, or friend averaged \$3,205 (SE_{β} \$867) less on personal care over the 12-month postdischarge period than those who relied primarily on an unaffiliated provider ($p = .001$).

In addition, we find the effect of having an affiliated care provider to be statistically equivalent to that of being self-reliant in one's daily care (i.e., identifying oneself as the primary source of daily care) ($F = .0878$, $p = .99$). Our model predicts that, controlling for sociodemographics and functional status, patients who attended to the majority of their own daily care needs and those who relied primarily on an affiliated provider averaged \$448 on personal care services over the 12-

Table 6: Multivariate Tobit Results—Estimating Utilization of Outpatient Personal Care and Rehabilitative Therapy as a Function of Patients' Sociodemographic Characteristics, Social Supports, and Functional Status

<i>Predictor</i>	<i>Personal Care</i>		<i>Rehabilitative Therapy: In-Home</i>		<i>Rehabilitative Therapy: Formal Setting</i>	
	β	(SE β)	β	(SE β)	β	(SE β)
<i>Sociodemographics</i>						
Female (vs. male)	583.74	(702.04)	885.22	(708.26)	1263.50	(1574.67)
Medicare/Age 65 + (vs. age < 65)	1489.06*	(843.76)	-1739.88**	(772.92)	-4283.98**	(1861.74)
Medex (vs. no Medex)	-71.28	(705.12)	761.95	(646.72)	-1149.70	(1871.00)
<i>Social Supports</i>						
Live alone (vs. live with others)	1554.01**	(780.90)	957.16	(696.10)	-356.22	(1850.40)
Primary provider of daily care ^{††}						
Self	-2944.49***	(991.74)	570.27	(945.40)	-2128.70	(2714.92)
Spouse	-3657.81***	(1076.33)	1593.25	(979.48)	411.44	(2867.81)
Child	-3165.64***	(1170.30)	-186.30	(1147.83)	-670.27	(2981.35)
Relative/Friend	-3104.40***	(1111.78)	-106.80	(1092.84)	-2111.40	(2978.72)
<i>Diagnosis/Function</i>						
Stroke (vs. hip fracture)	1573.30**	(708.12)	2378.10***	(645.72)	5225.02***	(1601.59)
Functioning: 1 month postdischarge (100-point scale)	-38.52**	(18.65)	0.62	(17.35)	-6.07	(49.21)
Functioning: 12 months postdischarge (100-point scale)	-19.86	(14.00)	3.24	(12.54)	44.15	(36.61)

* $p \leq .10$.

** $p \leq .05$.

*** $p \leq .01$.

[†]Reference category is patients who rely on unaffiliated individual as primary provider of daily care.

^{††}When these four binary variables are composited to a single indicator of affiliated caregiver support, the results indicate that patients who rely on an affiliated caregiver or themselves for their daily care spend an average of \$3,205 ($SE\beta = \867) less on personal care services than those who rely on unaffiliated caregivers. Results of a general F -test support the strategy of compositing these four effects.

month study period compared to \$3,653 among patients who relied primarily on unaffiliated sources ($F = 6.76, p = .001$).

The model also indicates a statistically significant effect of patients' living arrangement. Table 6 reveals that after adjusting for sociodemographic characteristics, functional status, and affiliated

caregiver support, patients living alone spent approximately \$1,554 (SE_{β} \$780) more on personal care services over the 12-month period than did patients living with others.

Other Effects. Diagnosis and functional status are also shown to be important predictors of formal personal care service utilization, with higher expenditures among patients with lower functional capacity and those recovering from a stroke. The results presented in Table 6 suggest that in the 12 months following inpatient rehabilitation, patients recovering from a stroke spent approximately \$1,573 (SE_{β} \$708) more on formal personal care services than those recovering from a hip fracture.

There is no evidence that supplementary Medicare insurance (Medex) or patient gender influence the level of personal care expenditure after adjusting for the other relevant determinants of that care. The former is the expected result since Medex does not reimburse for home care services.

Utilization of Rehabilitative Care Services

Among patients who received outpatient rehabilitative care, 31 percent of younger patients and 53 percent of older patients received it in their own home. Medicare permits in-home rehabilitative therapy to be reimbursed so long as the services have been prescribed by a physician for a patient who is recovering from acute illness and is homebound. Private health insurers (i.e., coverage for nonelderly sample members) typically mirror these Medicare rules.

Results of our analysis confirm the large differences between charges for rehabilitative care provided in the home versus charges for such care in a formal rehabilitation setting. Adjusting for patients' sociodemographics, social supports, and health status, the models predict that an average patient receiving in-home rehabilitative care spent \$2,921 less, over the 12-month study period, than that patient receiving care in a formal rehabilitation setting. Note, however, that one cannot infer that these services should in every case be provided in the home. While a portion of the price disparity reflects differences in providers' fee schedules, a share of the higher charges observed in formal therapy settings reflects the availability and use of specialized equipment that cannot practically be made available in the home environment (e.g., ultrasound, whirlpool, paraffin therapy, serial cast placement).

Both the in- and out-of-home rehabilitation models reveal age beyond 65 years and recovery from a stroke to be the only statistically

significant predictors of rehabilitative care expenditure. Table 6 reveals that, regardless of the care setting and controlling for all other factors, older patients utilize less rehabilitative care than younger ones, and stroke patients use more care than hip fracture patients. The model estimates rehabilitative care expenditures to be between \$1,740 (SE_{β} \$773) and \$4,284 (SE_{β} \$1,862) less for older patients, where in-home and formal outpatient rehabilitation settings are considered respectively. Twelve-month rehabilitation charges are shown to be \$2,378 (SE_{β} \$646) and \$5,225 (SE_{β} \$1,602) higher for stroke than for hip fracture patients, in the respective care settings.

Neither living alone nor the availability of affiliated caregiver support proved to be statistically significant determinants of the use of rehabilitative care. Patient gender also proved a statistically insignificant predictor of rehabilitative service expenditure.

Finally, Table 7 reveals that Medicare patients receiving rehabilitative care in-home versus in a formal setting are equally likely to rely on affiliated care providers. The former group may be assumed eligible for reimbursable in-home personal care and the latter may be assumed ineligible. Medicare reimburses in-home personal care if (and only if) a patient is recovering from acute illness, is homebound, and requires skilled nursing or rehabilitative care. Those receiving in-home rehabilitative care would meet these criteria. These data allow us to address the validity of *ex post moral hazard* concerns with respect to reimbursing in-home personal care.

DISCUSSION

SOCIAL SUPPORTS AND PERSONAL CARE SERVICE UTILIZATION

Our data support the observations of researchers who label as "social myth" the perception of an isolated elderly population—living alone, receiving little assistance or care from family members, and readily "dumped" into institutional care (Brody 1990; Shanas 1979a; Brody 1981; Shanas 1979b). Three-quarters of the patients in our sample live with at least one other individual, and among these patients 85 percent receive some care from the other household members. These findings are consistent with estimates of informal caregiving reported elsewhere (U.S. Congress, Office of Technology Assessment 1987; Rivlin and Wiener 1988; National Center for Health Statistics 1972). In addition, our data reveal equal availability of affiliated care provider support among young and old patients. The latter finding allows us to weigh

Table 7: Primary Source of Daily Personal Care by Location of Rehabilitative Care among Medicare Patients

<i>Location of Rehabilitative Care*</i>	<i>Primary Source of Daily Personal Care†</i>		
	<i>Affiliated Caregiver</i>	<i>Self</i>	<i>Unaffiliated Caregiver</i>
Formal rehabilitation setting (<i>N</i> = 34)	54.44	33.33	12.12
In-home rehabilitation (<i>N</i> = 38)	54.05	37.84	8.11
<i>p</i> -Value	0.99	0.72	0.59

*Patients receiving in-home rehabilitative care are assumed eligible for reimbursable personal care services. Those receiving rehabilitation in a formal setting are assumed ineligible for paid in-home personal care. Medicare permits payment for in-home personal care if (and only if) a patient is recovering from an acute illness, is homebound, and requires skilled nursing or rehabilitative care. Medicare enrollees receiving in-home rehabilitative care services would meet these criteria.

†Rows, rounded, sum to 100 percent.

the effect of generalizing—across age groups—a long-term care policy that would take into account patients' available social supports in determining service eligibility.

Multivariate Tobit analysis revealed that, among this sample of community-dwelling long-term care patients, those who identify an affiliated individual—spouse, child, other relative, or friend—as their primary provider of daily care averaged \$3,205 less on personal care services during the year following discharge than patients relying on unaffiliated sources.

Thirty-eight percent of patients reported that they were able to attend to most of their own personal care needs. These patients' expenditures on paid personal care were shown to be similar to those incurred by patients with a family member or friend acting as the primary provider of daily care. Therefore, we find that the only patients for whom personal care expenditures differed were those who both were unable to manage their own care and lacked an affiliated caregiver. For these patients, the reliance on unaffiliated sources of care is manifest by higher expenditures on personal care services.

Policy Implications

These results call for consideration of patients' social supports, along with their level of functional impairment, in assessing eligibility for reimbursable personal care services. At present, both Medicare and Medicaid coverage for personal care services is extremely limited, with the former permitting service only to patients who are recovering from an acute episode, are homebound, and have ongoing needs for skilled

care. Moreover, because private health insurers (i.e., indemnity plans and HMOs) typically model their long-term care coverage restrictions after Medicare's, nonelderly long-term care patients with private insurance are equally restricted in their access to reimbursable personal care services. Neither public nor private insurers explicitly include an assessment of patients' social supports in determining eligibility for reimbursable personal care.

Addressing Moral Hazard Concerns. Proposals to expand coverage for personal care services typically raise concerns about *ex post moral hazard*. However, considerable empirical evidence suggests that these concerns are largely unfounded. The National Long-Term Care Demonstration—the most comprehensive effort to date to empirically assess the effect of formal care services on the level of informal support—found no decline in family caregiving following the introduction of formally provided personal care assistance (Hanley, Wiener, and Harris 1991; Christianson 1988).⁴ Other, more localized research efforts report similar findings (Edelman and Hughes 1990; Kemper, Applebaum, and Harrigan 1987).

Our own data provide further insights. As shown in Table 7, Medicare patients receiving in-home therapeutic care—the only group within our sample that may be assumed eligible for reimbursable personal care—were as likely as those assumed ineligible for reimbursable personal care to report a spouse, child, other relative, or friend as their primary provider of daily care. Moreover, no statistically significant difference exists between the two groups' expenditures on personal care services ($p = .29$).

Thus, there is little basis, other than economic theory, by which to contend that families will abdicate or reduce their caregiving responsibilities if paid services are made available to those patients who require assistance with self-care and lack affiliated caregiver support.

Caring for Those without Affiliated Caregivers. Despite the availability of affiliated caregiver assistance to the vast majority of patients, there exists a population for whom paid personal care services are the primary source of assistance with daily care. These patients—unable to attend to some or all of their own personal care needs and lacking an affiliated care provider—constitute 10 percent of our sample of community-dwelling stroke and hip fracture patients. These community-dwelling patients are probably at greater risk of institutional placement than those with better capacity for self-care or better social supports. Research on the determinants of nursing home placement indicates loss of functional independence and lack of adequate social support to be leading predictors (Weissert and Cready 1989).

Our model indicates that, on average, this group spent \$3,653 on paid personal care over the 12-month study period (i.e., \$3,205 more than the average expenditure by patients with affiliated caregivers). Even adding to this sum the other important costs of living, the cost of community living for an average patient in this group is likely to remain well below the cost of nursing home care—estimated to be between \$2,500 and \$4,000 per month.

SOCIAL SUPPORTS AND REHABILITATIVE CARE UTILIZATION

With respect to rehabilitative care, our analyses indicate that patients' social supports are not an important determinant of utilization. This was not the anticipated result, as family and friends were expected to facilitate patients' access to rehabilitative care (e.g., by helping patients to arrange appointments, travel to therapy). The seeming unimportance of social supports with respect to rehabilitative care use is likely due, at least in part, to the Medicare provision—mirrored by most private health insurers—that permits in-home rehabilitation for home-bound patients. The results suggest that this provision is an important mechanism through which to allow patients access to rehabilitative care irrespective of their social supports.

AGE DIFFERENTIAL IN REHABILITATIVE CARE UTILIZATION

Finally, the substantial difference observed in rehabilitative care utilization among young and old patients is worthy of comment. While our data do not allow us to determine whether the disparity is due to differences in provider treatment recommendations or in patient adherence, it is consistent with other recent findings regarding age differentials in physician treatment recommendations. A recent study from the National Cancer Institute, for example, finds older cancer patients treated less aggressively than younger patients of comparable clinical status (Carbone, Newcomb, and Phillips 1992). Greenfield et al. report similar findings with respect to differential treatment of young and old patients with breast (Greenfield et al. 1987) and prostate (Bennett, Greenfield, Aronow, et al. 1991) cancers. Fleming et al. show lower rates of coronary care unit admission for older versus younger patients with acute myocardial infarction (Fleming, D'Agostino, and Selker 1991). These findings and our own call for further evaluation of age as a medical decision-making criterion to ensure that

justifiable clinical standards rather than societal or institutional biases underlie the observed treatment differences.

It is possible that the observed age differential is an artifact of sample selection, wherein older patients requiring rehabilitative care are more readily discharged to institutional settings, while younger patients are discharged to the community. Even this, however, is a practice that would warrant further evaluation before sanctioning the differential treatment of young and old patients requiring long-term rehabilitation.

CONCLUSION

We find social supports to be a critical determinant of personal care service utilization and an unimportant predictor of rehabilitative therapy utilization among our sample of noninstitutionalized long-term care patients. This suggests that, if expansion of community-based long-term care coverage into the area of personal care services is to proceed, it should do so with consideration of patients' social supports as well as their functional status as key elements of eligibility determination. Doing so would avert the expense of making these services universally available to noninstitutionalized long-term care patients, as the vast majority of these patients—at least as represented by our sample—appear to rely on affiliated sources of care or to be capable of self-care. However, for those patients who lack affiliated sources of care but have impairments that necessitate assistance with daily personal care, the availability of paid personal care services may be a critical step to averting nursing home placement. Our results indicate that, for this patient group, the cost of community-based personal care services (and the other relevant expenses of community living) is likely to be small relative to the cost of institutional care.

In addition, we find compelling evidence that, where reimbursable personal care services are available, family members do not discontinue their caregiving role. These findings are consistent with those of previous research efforts, including those of the National Long-Term Care Demonstration (Hanley, Wiener, and Harris 1991; Christianson 1988). In this way, we add to the empirical evidence that indicates little basis, other than economic theory, for concerns about *ex post moral hazard* in this context.

While we find evidence that our analytic sample is representative of the broader U.S. population of community-dwelling long-term care patients, further confirmatory research would be useful to clarify the

costs that should be anticipated if a program such as the one we propose is to be implemented.

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NOTES

1. Race, educational status, and income are not included as sociodemographic indicators. Minimal variability in race as a categorical variable precluded its being a meaningful predictor in the model (i.e., only six patients in the sample are nonwhite). Education and income are excluded because their introduction created sizable problems of multicollinearity in the model. Both variables are highly correlated with age, with older patients having lower income ($r = -.45$) and less education ($-.44$) than younger patients. Associations among these factors—common in research (i.e., due to such factors as retirement and fewer years of formal education among the elderly)—are made more extreme by the sample size and predominance of advanced age in our sample.
2. The Tobit model was developed by Tobin (1958) as a convenient way to overcome the biasing effects of linear regression with censored data. Tobit estimation proceeds by directly accounting for that part of the data that is clustered on a censored value (i.e., \$0 in this example) and that part of the data that is distributed above or below the censoring point (i.e., greater than \$0, in this example).
3. An incremental analysis of R^2 values allows us to determine upper and lower bounds for the portion of variance that is explained by groups of variables. This approach reveals that social supports account for between 31.3 and 77.9 percent of *explained* variance in the model. Functional status accounts for between 28.2 and 49.9 percent of explained variance. Sociodemographic characteristics account for between 5.2 and 12.3 percent of explained variance.
4. The National Long-Term Care Demonstration measured assistance, both formal and informal, as the number of contacts each week. It is possible that, while the number of family contacts did not decline, the amount of time spent or tasks performed by informal supports did shift following the introduction of formal care.

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